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(54) OIL-IN-WATER EMULSIFIED PRODUCT

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an oil-in-water emulsified product containing phytosterol and/or phytosterol fatty acid ester each having cholesterol absorption inhibitory action, and having stable oil-in-water emulsification for a long period of time and excellent flavor and palate feeling, and suitable especially as an acid oil-in- water emulsified product, such as mayonnaise and dressing.

SOLUTION: This oil-in-water emulsified product is obtained by incorporating therein phytosterol and/or phytosterol fatty acid ester and yolk processed with an enzyme.

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CLAIMS

[Claim(s)]
[Claim 1] The oil-in-water type emulsification object characterized by plant sterol and/or plant sterol fatty acid ester, and containing the enzyme processing yolk.
[Claim 2] The oil-in-water type emulsification object according to claim 1 which contains plant sterol and/or plant sterol fatty acid ester 0.1 to 40% of the weight by plant sterol conversion.
[Claim 3] The oil-in-water type emulsification object according to claim 1 or 2 which contains the enzyme processing yolk one to 15% of the weight.
[Claim 4] An oil-in-water type emulsification object given in any of claims 1-3 which are the enzyme processing yolks obtained when the enzyme processing yolk processed the yolk by HOSUFO lipase A and the protease they are.
[Claim 5] An oil-in-water type emulsification object given in any of claims 1-4 which are acid oil-in-water type emulsification objects they are.
[Claim 6] The manufacture approach of the oil-in-water type emulsification object characterized by emulsifying the oil phase containing plant sterol and/or plant sterol fatty acid ester, and the aqueous phase containing the enzyme processing yolk.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially the oil-in-water type emulsification object of this invention is suitable as acid oil-in-water type emulsification objects, such as mayonnaise and a dressing, about the oil-in-water type emulsification object with which this invention contains plant sterol and/or plant sterol fatty acid ester.
[0002]
[Description of the Prior Art] It is known by plant sterol and plant sterol fatty acid ester for many years that the absorption depressant action of the cholesterol from a small intestine occurs, and it is used for them as a plasma cholesterol concentration fall agent. Absorption of cholesterol requires that cholesterol should dissolve in a bile acid micell. However, the amount of dissolutions to the bile acid of cholesterol is low, and most is in the condition of an emulsion.
[0003] On the other hand, an amount almost comparable as cholesterol also dissolves plant sterol and plant sterol fatty acid ester in a bile acid micell. Therefore, when cholesterol and plant sterol live together, the amount of dissolutions to the bile acid micell of cholesterol will decrease. Moreover, the absorption coefficient from the small intestine of plant sterol is low, since it remains in a small intestine lumen, the amount of dissolutions to the bile acid micell of cholesterol becomes [being restricted with as, and], and absorption of cholesterol will be controlled. Therefore, in the case of the Homo sapiens who is easy to be influenced of the cholesterol taken in from a meal, plant sterol and plant sterol fatty acid ester are clinically used as an effective plasma cholesterol fall agent.
[0004] That amount is very few, although this plant sterol and plant sterol fatty acid ester are contained in vegetable oil and fat, an soybean, wheat, etc. and it is taken in with the everyday meal. If a current Japanese's eating habits are looked at, in order to control absorption of the cholesterol from a meal, day about 1-2g [per] plant sterol is required of plant sterol conversion, and it is difficult to take in a lot of such plant sterol and plant sterol fatty acid ester with the usual Homo sapiens's meal. It considers as the approach of taking in efficiently the plant sterol which has such a function, and plant sterol fatty acid ester, and although the various food which used plant sterol and plant sterol fatty acid ester is proposed, the following is mentioned as a patent about an oil-in-water type emulsification object.
[0005] Although the food product based on a fat which is within the limits whenever [esterification / of a sterol / whose] are 40 thru/or 90% is proposed by JP,11-127779,A and oil-in-water type emulsification objects, such as mayonnaise and a dressing, are mentioned to it as this food product including at least 1% of the weight of the sterol equivalent, it is limited to the low oil dressing whose fat is about 33%, and is hard to say that emulsion stability is enough.
[0006] the [moreover, / international public presentation] — in a No. 99/48378 official report, the fats-and-oils constituent which made the fats and oils which contain diacylglycerol 15% of the weight or more dissolve thru/or distribute plant sterol 1.2 to 20% of the weight proposes — having — as this fats-and-oils constituent — a dressing, mayonnaise, and roast meat — hanging down — etc. — although the oil-in-water type emulsification object is mentioned — this oil-in-water type emulsification object — emulsion stability — enough — **** — it is hard to say.

[0007] Furthermore, although the salad dressing which has sterol ester, an emulsifier or hydrocolloid, and a fat crystal inhibitor, and its manufacture approach are proposed by JP,2000-127779,A, since a lot of emulsifiers and hydrocolloids for emulsification stabilization are blended, there is a problem that flavor and mouthfeel are bad.
[0008] Therefore, the purpose of this invention is an oil-in-water type emulsification object containing the plant sterol which has cholesterol absorption depressant action, and/or plant sterol fatty acid ester, and offering an oil-in-water type emulsification object especially suitable as acid oil-in-water type emulsification objects, such as mayonnaise and a dressing, with stably sufficient flavor and stably sufficient mouthfeel has oil-in-water type emulsification for a long period of time.
[0009]
[Means for Solving the Problem] this invention persons did the knowledge of the ability to attain the above-mentioned purpose by combining the enzyme processing yolk with plant sterol and/or plant sterol fatty acid ester as an emulsifier, as a result of repeating examination wholeheartedly that the above troubles about acid oil-in-water type emulsification objects, such as an oil-in-water type emulsification object containing plant sterol and/or plant sterol fatty acid ester especially mayonnaise, and a dressing, should be solved.
[0010] This invention was made based on the above-mentioned knowledge, and offers the oil-in-water type emulsification object characterized by plant sterol and/or plant sterol fatty acid ester, and containing the enzyme processing yolk.
[0011]
[Embodiment of the Invention] Hereafter, the oil-in-water type emulsification object of this invention is explained to a detail. The plant sterol used by this invention is a component which constitutes a vegetable cell membrane, and exists widely in vegetation. For example, there are some which made the origin legumes, such as seeds, such as cereals, such as corn and wheat, and Goma, and an soybean, the rapeseed, the coconut, and the cottonseed. Moreover, all can be used although there is plant stanol, such as plant sterol, such as beta sitosterol, campesterol, a BURASHIKA sterol, fucosterol, and an ergosterol, and beta-sitostanol, campestanol, in plant sterol.
[0012] Moreover, as plant sterol fatty acid ester, a ****** rare ****** ester object, the plant sterol fatty-acid-ester content fats and oils obtained by carrying out the esterification reaction of the above-mentioned plant sterol, a partial glyceride, and/or a triglyceride which are mentioned later under a non-solvent, using lipase or alkali as a catalyst are used for vegetation.
[0013] Although especially the fatty acid that constitutes the above-mentioned plant sterol fatty acid ester is not limited, the saturated fatty acid and/or unsaturated fatty acid of carbon numbers 4-24 are mentioned preferably, its saturated fatty acid and/or unsaturated fatty acid of carbon numbers 16-24 are [among these] desirable, and its unsaturated fatty acid of carbon numbers 16-24 is still more desirable.
[0014] The above-mentioned plant sterol fatty-acid-ester content fats and oils are explained further below. As the above-mentioned partial glyceride used for manufacture of the above-mentioned plant sterol fatty-acid-ester content fats and oils, a reaction monoglyceride, a distillation monoglyceride, diglyceride, the diglyceride extracted from natural fats and oils are mentioned.
[0015] moreover, as the above-mentioned triglyceride used for manufacture of the above-mentioned plant sterol fatty-acid-ester content fats and oils For example, the fats and oils with which a configuration fatty acid consists of the saturated fatty acid or unsaturated fatty acid of carbon numbers 4-24, concrete -- palm oil and a palm -- the palm system fats and oils of the melting point section in an olein super olein palm stearin palm -- The Rau Lynne system fats and oils, SAL fat, and Xia fat, such as soybean oil, soybean salad oil, oleum rapae, rapeseed salad oil, cotton seed oil, cottonseed salad oil, safflower oil, a sunflower oil and high OREIKKU safflower oil, and a high OREIKKU sunflower oil, corn oil, rice bran oil, palm kernel oil, palm oil - Natural oil fat, such as mango fat, cacao butter, beef tallow, lard, fish oil, whale oil, and milk fat, Synthetic oil fat, such as diglyceride and MCT (medium-chain-fatty-acid triglyceride), and the fats and oils which performed physical or chemical preparation, such as these hardened oil, a judgment oil, or

an ester interchange, further can be used combining independence or two sorts or more. In these, it is desirable to use preferably 30 % of the weight or more and the thing contained 50% of the weight or more most preferably 45% of the weight or more still more preferably for the unsaturated fatty acid of carbon numbers 16-24 as a configuration fatty acid of the fats and oils to be used.

[0016] One sort chosen from a glycerol, fatty-acid lower alcohol ester, and a fatty acid according to the need other than the above-mentioned partial glyceride and/or a triglyceride or two sorts or more may be used. As the above-mentioned fatty-acid lower alcohol ester, although there is especially no limit, as for a fatty-acid part, what is the saturation or the unsaturated fatty acid of the saturation of carbon numbers 4-24 or unsaturated fatty acid, especially carbon numbers 16-24 is desirable, and an alcoholic part has that desirable whose boiling point of the alcohol of isolation is lower alcohol 100 degrees C or less when [, such as ethanol and a methanol,] it hydrolyzes. Moreover, although there is especially no limit also as the above-mentioned fatty acid, it is desirable to use the saturation or the unsaturated fatty acid of the saturation of carbon numbers 4-24 or unsaturated fatty acid, especially carbon numbers 16-24.

[0017] When using lipase as a catalyst in the above-mentioned esterification reaction, although especially the class is not restricted, as this lipase, it is desirable to use a thing without site selectivity. Specifically, it is Alcaligenes. A group and Chromobacterium A group and Pseudomonas The enzyme obtained from a group and a Humicola group is desirable, and it is Alcaligenes in this. A group and Chromobacterium A group and Pseudomonas The enzyme obtained from a group is still more desirable, and it is Alcaligenes. The enzyme obtained from a group is the most desirable. These enzymes may be fixed and used for support, such as the diatom earth, an alumina, ion exchange resin, activated carbon, and a ceramic, although it is also possible to use it with enzyme powder.

[0018] Moreover, when using lipase as a catalyst, since it makes hydrolysis of a reaction oil as low as possible that it is 500 ppm or less still more preferably and it can make low preferably 900 ppm or less of loss at a deordorization process, the moisture content of the system of reaction of the above-mentioned esterification reaction is desirable. Moreover, the above-mentioned esterification reaction can be performed under the conditions of ordinary pressure or reduced pressure.

[0019] Moreover, when using alkali as a catalyst in the above-mentioned esterification reaction, as this alkali, it is desirable to use a sodium methylate. When using a sodium methylate as a catalyst, after heating mixture with plant sterol, a partial glyceride, and/or a triglyceride at 80-100 degrees C and dehydrating to the moisture of 500 ppm or less, it is good to add a catalyst (sodium methylate) and to react under ordinary pressure or reduced pressure. Acids, such as a citric acid and a phosphoric acid, neutralize after esterification reaction termination, and rinsing and dehydration are performed. In addition, those who used lipase as a catalyst in this invention are [using alkali rather than] efficient and economical.

[0020] Moreover, when performing the above-mentioned esterification reaction by making above-mentioned lipase or alkali into a catalyst, it is desirable to perform a random ester interchange. Since plant sterol is esterified at random with a partial glyceride and/or the configuration fatty acid of TORIGURISEDO by performing a random ester interchange, the configuration fatty acid composition of plant sterol fatty acid ester and the configuration fatty acid composition of a triglyceride become the same substantially.

[0021] Solvents, such as a hexane and an acetone, or dry type judgment may remove the plant sterol of isolation from the plant sterol fatty-acid-ester content fats and oils obtained as mentioned above.

[0022] Moreover, plant sterol fatty-acid-ester content fats and oils are refined by the purification approach of the usual fats and oils, and the same approach. The purification approaches of the usual fats and oils here are bleaching and deordorization or deoxidation, bleaching, and deordorization. By refining, a smell peculiar to plant sterol is lost and flavor and the good plant sterol fatty-acid-ester content fats and oils of a color tone are obtained.

[0023] Although the plant sterol in the oil-in-water type emulsification object of this invention and/or especially the content of plant sterol fatty acid ester are not restricted, it is preferably

good to consider as 1 - 20 % of the weight most preferably 0.5 to 30% of the weight still more preferably 0.1 to 40% of the weight at plant sterol conversion. If this content exceeds 40 % of the weight, mouthfeel of the oil-in-water type emulsification object obtained will become bad, and when this content takes in an oil-in-water type emulsification object at less than 0.1 % of the weight, on the other hand, a cholesterol fall operation will not fully be demonstrated.

[0024] In the oil-in-water type emulsification object of this invention, plant sterol and plant sterol fatty acid ester may be used independently, respectively, and you may use together. when using together, plant sterol (A) and especially weight ratio A/B with plant sterol fatty acid ester (B) limit -- not having -- for example, within the limits of 1000 / 1 - 1/1000 -- desirable -- 30 / 1 - 1/200 -- what is necessary is just to use it still more preferably within the limits of 10 / 1 - 1/30

[0025] In addition to above-mentioned plant sterol and/or plant sterol fatty acid ester, the oil-in-water type emulsification object of this invention contains the enzyme processing yolk. If the yolk which is not processed with an enzyme is used, the emulsion stability of the oil-in-water type emulsification object obtained will become what was remarkably inferior.

[0026] As a substrate for preparing the above-mentioned enzyme processing yolk, fresh egg yellow, the sterilization yolk, the salting yolk, and the sugar-added yolk can be used. Moreover, in order to reduce the cholesterol in an oil-in-water type emulsification object, it is good also considering the yolk which reduced cholesterol as a substrate. Especially if it takes into consideration suppressing growth of the flavor of the oil-in-water type emulsification object obtained and the microorganism at the time of an enzyme reaction, the salting yolk is especially suitable, and it is good for using the salting yolk with which salt was added three to 20% of the weight to use the salting yolk with which salt was added five to 8% of the weight at best still more preferably.

[0027] In this invention, it is desirable to use together HOSUFO lipase A and a protease as an enzyme used in the case of enzyme processing of the yolk.

[0028] It is the enzyme which carries out the catalyst of the reaction which the above-mentioned HOSUFO lipase A is also called phospholipid hydrolase, and decomposes phospholipid into lysophospholipid. In this invention By the difference in the location of an ester bond which acts, two kinds, HOSUFO lipase A1 (EC3.1.1.32) and HOSUFO lipase A2 (EC3.1.1.4), can be used. for example, the optimal pH which made the origin the microorganism (for example, Aspergillus oryzae group) -- HOSUFO lipase A1 of an acid range the optimal pH which made pancreatic juice of the mammals, such as a pig, the origin -- HOSUFO lipase A2 of a weak base genital area etc. -- commercial HOSUFO lipase A can be used.

[0029] It is the enzyme which carries out the catalyst of the reaction which understands protein a hydrolyzed part, and by this invention, commercial proteases, such as what made vegetation, the animal, and the microorganism the origin, for example, the bromelain which made the pineapple the origin, a papain which made the papaya the origin, a trypsin which made mammalian pancreatic juice the origin, a pepsin which made mammalian stomach juice the origin, and a protease of the mold origin, can be used for the above-mentioned protease, and especially its bromelain is the optimal.

[0030] As these enzymes, the enzyme of the powder or liquid of the food grade marketed can be used.

[0031] Although HOSUFO lipase A and a protease are the sequence of arbitration or can be added to coincidence in the case of enzyme processing of the yolk, it is desirable to carry out enzyme processing by the protease after the enzyme processing by HOSUFO lipase A from the point of avoiding hydrolysis of the HOSUFO lipase A by the protease.

[0032] The additions of HOSUFO lipase A are a 0.2 - 100 HOSUFO lipase unit and an amount which is still more preferably equivalent to the active mass of 0.5 - 20 HOSUFO lipase unit preferably to 1g of yolks. A HOSUFO lipase unit is a unit showing the active mass of HOSUFO lipase, and 1 HOSUFO lipase unit is an active mass which separates the fatty acid of one micromole in 1 minute after the phospholipid in the yolk, when HOSUFO lipase A is made to act on the yolk at pH8.0 and 40 degrees C.

[0033] The additions of a protease are 0.01 - 10 protease unit and an amount which is still more

preferably equivalent to the active mass of 0.1 - 5 protease unit preferably to 1g of yolks. A protease unit is a unit showing the active mass of a protease, and 1 protease unit is an active mass which shows whenever [coloration / which is equivalent to the thyrosin of one micromole in 1 minute], when a protease is made to act on milk casein at pH7.0 and 37 degrees C.
[0034] In addition, the enzyme which consists of concomitant use of HOSUFO lipase A and a protease may be added on the following criteria. namely, the addition (total quantity) of the above-mentioned enzyme -- the yolk 100 weight section -- receiving -- desirable -- the 0.001 - 0.8 weight section -- it is the 0.01 - 0.3 weight section still more preferably. this time -- the weight ratio of HOSUFO lipase A and a protease -- desirable -- 20 / 80 - 90/10 -- it is 40 / 60 - 85/15 still more preferably.
[0035] Enzyme processing of the yolk is good for the protein, the HOSUFO lipase A, and the protease of the yolk not to denaturalize with heat, but to carry out with the optimum temperature of HOSUFO lipase A and a protease, and usually good to carry [20-60-degree C] out preferably in a 40-55-degree C temperature requirement. Moreover, stirring with an agitator etc. during enzyme processing is desirable.
[0036] Moreover, it is desirable the optimal pH of HOSUFO lipase A and a protease and to usually adjust to the range of pH 3-9 in the case of enzyme processing of the yolk. As a pH regulator of this purpose, especially if it is a food grade, it is not limited, for example, acid, such as acidulants, such as a lactic acid, a citric acid, a gluconic acid, an adipic acid, a succinic acid, a tartaric acid, a fumaric acid, a malic acid, a phosphoric acid, L-ascorbic acid, an acetic acid, and vinegar, a sodium dihydrogenphosphate, a potassium dihydrogenphosphate, vinegar, fruit juice, and fermented milk, a sodium hydroxide and a potassium hydroxide, a calcium hydroxide, a sodium citrate, sodium acetate, disodium hydrogenphosphate the potassium phosphate, phosphoric-acid 3 sodium, sodium ascorbate, etc. can be used. Moreover, calcium salts, such as mineral suitable as a stabilizer of an enzyme, for example, a calcium chloride, and calcium primary phosphate, may be added in the case of enzyme processing of the yolk.
[0037] Although there is especially no constraint in the reaction time in the case of enzyme processing of the yolk, it is desirable to carry out within the limits of 1 - 30 hours. In addition, although the approach of hydrolyzing according to above-mentioned conditions by the batch process as an approach of carrying out enzyme processing of the yolk is adopted, the approach of hydrolyzing with continuous system may be used.
[0038] Extent of the decomposition to the lysophospholipid of the phospholipid of the yolk by HOSUFO lipase A and extent of hydrolysis of the protein of the yolk by the protease are influenced [the addition of an enzyme, reaction temperature, pH at the time of reaction initiation, the existence of the stabilizer of an enzyme, and] of reaction time. Although especially extent of these decomposition is not limited in this invention, the decomposition to the lysophospholipid of the phospholipid of the yolk by HOSUFO lipase A is good to perform 25 - 100% of the total phosphorus lipid contained in the yolk even to extent decomposed into lysophospholipid, and hydrolysis of the protein of the yolk by the protease is good to perform the heating freezing characteristic of the protein contained in the yolk even to extent lost completely.
[0039] Thus, about the obtained enzyme processing yolk, it is good to carry out deactivation of the enzyme used for the enzyme reaction by the suitable approach, for example, heat-treatment.

[0040] The content of the above-mentioned enzyme processing yolk is good to consider as 3 - 12 % of the weight still more preferably one to 15% of the weight preferably among the oil-in-water type emulsification object of this invention from the point which there improves stabilization and flavor, and mouthfeel of oil-in-water type emulsification. The viscosity of the oil-in-water type emulsification object which will be obtained if there are too many these contents rises remarkably, and if there are too few these contents, oil-in-water type emulsification will become unstable.
[0041] As for the oil-in-water type emulsification object of this invention, it is desirable that they are acid oil-in-water type emulsification objects, such as mayonnaise and a dressing.
[0042] The oil-in-water type emulsification object of this invention contains plant sterol and/or

plant sterol fatty acid ester, and the enzyme processing yolk as an indispensable component, and although flavor and mouthfeel are good, since it gives mouthfeel and flavor which suited with the oil-in-water type emulsification object made into the purpose, the raw material of the arbitration used for the usual oil-in-water type emulsification mold food can be used for it in the range which does not spoil the purpose of this invention.

[0043] As such a raw material, for example palm oil — the inside of – palm olein super olein palm stearin palm — the melting point section, soybean oil, soybean salad oil, oleum rapae, rapeseed salad oil, cotton seed oil, and a cottonseed — salad oil, safflower oil, a sunflower oil, high OREIKKU safflower oil, and a high OREIKKU sunflower oil – Natural oil fat, such as corn oil, rice bran oil, palm kernel oil, palm oil, SAL fat, Xia fat, mango fat, cacao butter, beef tallow, lard, fish oil, whale oil, and milk fat, Synthetic oil fat, such as diglyceride and MCT (medium-chain-fatty-acid triglyceride), Physical or the fats and oils which performed chemical preparation, such as these hardened oil, a judgment oil, or an ester interchange, furthermore, independence, Or fats and oils, the cane sugar, the lactose, the grape sugar, the fruit sugar, the maltose, the maltooligosaccharide, the isomalt oligosaccharide, the fructo oligosaccharide, the galactosaccharide, the nigero-oligosaccharide, the starch syrup and paratinose trehalose which combined two or more sorts, Saccharides, such as a sorbitol maltitol mannitol, a reduction starch sugar ghost, and poly glucose, Dextrins, such as a straight chain dextrin, a branching dextrin, and an annular dextrin the modified starch and starch which process starch and starch with enzymes, such as an amylase, and are obtained — receiving — an acid and alkali treatment — chemical or the modified starch obtained by performing physical processing, such as – esterification, acetylation, formation of phosphoric-acid bridge formation, heating, and moist heat treatment, — Furthermore, the modified starch made to become a paste by heat-treatment beforehand so that it may be easy to dissolve these modified starch in water Fresh milk, cow's milk, other beast milk, condensed milk, sweetened condensed milk, a skimmilk, skimmilk powder, whole milk powder, casein casein sodium rennet casein, milk serum protein, a whey whey powder whey protein concentrate and butter, a buttermilk buttermilk powder cream and concentration cream total milk protein – Dairy products, such as milk calcium cream natural cheese process cheese and fermented milk, Protein, such as egg products, such as a whole egg, the yolk, albumens, and those powder, and soybean protein, gelatin, Various fruit juice, concentrated juice, a dried fruit, vegetable juice, pickles-in-vinegar vegetables, dehydrated vegetables, Seasonings, such as salts, such as refined salt, rock salt, a natural salt, a natural salt, and potassium chloride, and sodium glutamate sodium-succinate inosinic acid soda, a yeast extract, oceanic bonito extractives, HAP-HAV, spirits of wine, xanthan gum pectin locust-bean-gum gellant gum guar gum, and a tare — thickening stabilizers, such as a gun TOGAMU alginic acid, and sodium alginate curdlan, microfilament-like cellulose methyl cellulose, soybean polysaccharide, a lactic acid, a citric acid, and a gluconic acid — An adipic acid, a succinic acid, a tartaric acid, a fumaric acid, a malic acid, a phosphoric acid, L-ascorbic acid, Coloring agents, such as acidulants, such as an acetic acid and vinegar, a spice, a spice extract, and beta carotene, Antioxidants, such as a tocopherol, L-ascorbyl stearate, and a L-ascorbic acid palmitic-acid ester tea extract, the charge of bitterness, preservatives, a reinforcement, perfume, etc. are mentioned, and it can be used for arbitration.

[0044] Although an oil-in-water type is made to emulsify in case the above-mentioned raw material is blended with the oil-in-water type emulsification object of this invention since a water-soluble raw material is dissolved in the aqueous phase and an oil solubility raw material is usually dissolved in an oil phase, an oil phase may be made to distribute a water-soluble raw material, and you may emulsify to an oil-in-water type. The oil-in-water type emulsification objects of this invention are [20 – 90 % of the weight of aqueous phase, and 80 – 10 % of the weight of oil phases] 30 – 80 % of the weight of aqueous phase, and 70 – 20 % of the weight of oil phases most preferably still more preferably comparatively preferably [oil phase / the aqueous phase and] 25 – 85 % of the weight of aqueous phase, and 75 – 15 % of the weight of oil phases.

[0045] The oil-in-water type emulsification object of this invention can be manufactured as follows, for example. Plant sterol and/or plant sterol fatty acid ester are made to contain

modified starch, a thickening stabilizer, etc. if needed, and it considers as an oil phase, and water is made to contain spices, such as saccharides, such as acidulants, such as vinegar, salt, and a starch syrup, and pepper, the enzyme processing yolk and if needed, and it considers as the aqueous phase. Subsequently, the above-mentioned oil phase is added stirring the above-mentioned aqueous phase, and an oil-in-water type preliminary emulsification object is obtained. This is processed with homogenization machines, such as emulsifiers, such as a colloid mill, and a homogenizer, finishing emulsification is performed, and the oil-in-water type emulsification object of this invention is obtained.

[0046]

[Example] Next, although an example and the example of a comparison are given and this invention is further explained to a detail, these do not restrict this invention at all.

[0047] (Example 1) HOSUFO lipase A20.015kg (555000 HOSUFO lipase unit) of the pancreatic juice origin of a pig was added to 100kg of salting yolks which adjusted the salting yolk to pH8.2 by the sodium hydroxide 7.5%, it processed at 40 degrees C for 7 hours, subsequently bromelain 0.003kg (90000 protease unit) was added, and it processed at 40 degrees C for 4 hours, it cooled to 5 degrees C, and the enzyme processing yolk (I) was obtained. Next, the water 7.5 weight section, the starch syrup (25 % of the weight of moisture) 4 weight section, the brewing vinegar 4 weight section, the rock salt 2 weight section, the sodium glutamate 0.2 weight section, the mustard seed powder 0.3 weight section, and the above-mentioned enzyme processing (yolk I) 7 weight section were mixed, and the aqueous phase was prepared. The plant sterol 2 weight section was independently dissolved in the heated soybean salad oil 73 weight section, and the oil phase was prepared. Subsequently, the above-mentioned oil phase was added stirring the above-mentioned aqueous phase, the oil-in-water type preliminary emulsification object was obtained, this was emulsified in the colloid mill and the oil-in-water type emulsification object of this invention was obtained. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0048] (Example 2) Alcaligenes which is lipase without site selectivity after dissolving the plant sterol 10 weight section of the soybean origin in the heated oleum rapae 90 weight section The lipase 1 weight section of the group origin was added, at 65 degrees C, the moisture of the system of reaction was adjusted to 200 ppm, and the ester exchange reaction was performed. Subsequently, lipase was filtered and removed, the clay 2 weight section was added and bleached, it deodorized at the temperature of 200 degrees C, and plant sterol fatty-acid-ester content fats and oils (I) were obtained. The presentations of these fats and oils (I) were 15 % of the weight of plant sterol fatty acid ester, 1 % of the weight of monoglycerides, 12 % of the weight of diglycerides, 71 % of the weight of triglycerides, and 1 % of the weight of unreacted plant sterol. The fatty acid composition of the plant sterol fatty acid ester of these fats and oils (I), a triglyceride, and diglyceride was shown in the following table 1. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 except having used the above-mentioned plant sterol fatty-acid-ester content fats and oils (I) instead of the oil phase of an example 1. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0049] HOSUFO lipase A1 0.02kg (800000 HOSUFO lipase unit) of the Aspergillus oryzae group origin is added to 100kg of salting yolks which added 7kg of water, and 3kg of brewing vinegar to 90kg of salting yolks 8%, and were adjusted to pH4.6. (Example 3) It processed at 45 degrees C for 7 hours, and subsequently bromelain 0.005kg (150000 protease unit) was added, and it processed at 45 degrees C for 3 hours, it cooled to 5 degrees C, and the enzyme processing yolk (II) was obtained. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 instead of the enzyme processing yolk (I) of an example 1 except having used the above-mentioned enzyme processing yolk (II). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C

refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.
[0050] (Example 4) The same processing as an example 2 was performed after dissolving the plant sterol 10 weight section of the soybean origin in the heated palm olein 90 weight section, and plant sterol fatty-acid-ester content fats and oils (II) were obtained. The presentations of these fats and oils (II) were 14 % of the weight of plant sterol fatty acid ester, 1 % of the weight of monoglycerides, 12 % of the weight of diglycerides, 72 % of the weight of triglycerides, and 1 % of the weight of unreacted plant sterol. The fatty acid composition of the plant sterol fatty acid ester of these fats and oils (II), a triglyceride, and diglyceride was shown in the following table 1. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 except having used the above-mentioned plant sterol fatty-acid-ester content fats and oils (II) instead of the oil phase of an example 1. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.
[0051] The water 39.58 weight section, the grape sugar fruit-sugar liquid-sugar (25 % of the weight of moisture) 8 weight section, (Example 5) The granulated sugar 2 weight section, the 50% fermented milk acid 0.5 weight section, the lemon fruit-juice 1 weight section, The brewing vinegar 4 weight section, the refined salt 1.5 weight section, the succinic-acid disodium crystal 0.01 weight section, the curry powder 2 weight section, the mustard seed powder 0.2 weight section, the powder pepper 0.01 weight section, and the above-mentioned enzyme processing (yolk I) 8 weight section were mixed, and the aqueous phase was prepared. Independently, in the above-mentioned plant sterol fatty-acid-ester content (fats-and-oils I) 30 weight section, the modified starch 3 weight section, the xanthan gum 0.1 weight section, and the Calais flavor 0.1 weight section which became a paste potato starch after phosphoric-acid bridge formation were distributed and dissolved, and the oil phase was prepared. Subsequently, the above-mentioned oil phase was added stirring the above-mentioned aqueous phase, the oil-in-water type preliminary emulsification object was obtained, this was homogenized by the homogenization pressure force of 20MPa(s) with the homogenizer, and the oil-in-water type emulsification object of this invention was obtained. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.
[0052] (Example 1 of a comparison) The oil-in-water type emulsification object was obtained like the example 1 except having used the salting yolk 7.5% instead of the enzyme processing yolk (I). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, it was destroyed and the oil separated oil-in-water type emulsification. Moreover, this oil-in-water type emulsification object was what is inferior in flavor and mouthfeel.
[0053] (Example 2 of a comparison) The oil-in-water type emulsification object was obtained like the example 5 except having used the salting yolk 7.5% instead of the enzyme processing yolk (I). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, it was destroyed and the oil separated oil-in-water type emulsification. Moreover, this oil-in-water type emulsification object was what is inferior in flavor and mouthfeel.
[0054] (Example 6) The same processing as an example 2 is performed after dissolving the plant sterol 43 weight section of the soybean origin in the mixture of the heated oleum rapae 19 weight section and the ethyl oleate ester 38 weight section, and it is plant sterol fatty-acid-ester content fats and oils (III). It obtained. These fats and oils (III) Presentations were 76 % of the weight of plant sterol fatty acid ester, 0 % of the weight of monoglycerides, 4 % of the weight of diglycerides, 17 % of the weight of triglycerides, and 3 % of the weight of unreacted plant sterol. These fats and oils (III) The fatty acid composition of plant sterol fatty acid ester, a triglyceride, and diglyceride was shown in the following table 1. Next, it is the above-mentioned plant sterol fatty-acid-ester content fats and oils (III) instead of plant sterol fatty-acid-ester

content fats and oils (I). The oil-in-water type emulsification object of this invention was obtained like the example 5 except having used. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0055]

[Table 1]

(単位：重量%)

	植物ステロール脂肪酸エステル含有油脂		
	(I)	(II)	(III)
トリグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	59	60	90
C18:2	22	21	6
others	13	13	3
植物ステロール脂肪酸エステルの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	57	59	91
C18:2	22	22	5
others	15	13	3
ジグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	58	60	91
C18:2	22	22	4
others	14	12	4

[0056]

[Effect of the Invention] The oil-in-water type emulsification object of this invention is an oil-in-water type emulsification object containing the plant sterol which has a plasma cholesterol concentration fall function, and/or plant sterol fatty acid ester, and flavor and its mouthfeel are stably [oil-in-water type emulsification] good for a long period of time.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention] Especially the oil-in-water type emulsification object of this invention is suitable as acid oil-in-water type emulsification objects, such as mayonnaise and a dressing, about the oil-in-water type emulsification object with which this invention contains plant sterol and/or plant sterol fatty acid ester.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] The oil-in-water type emulsification object of this invention is an oil-in-water type emulsification object containing the plant sterol which has a plasma cholesterol concentration fall function, and/or plant sterol fatty acid ester, and flavor and its mouthfeel are stably [oil-in-water type emulsification] good for a long period of time.

[Translation done.]

TECHNICAL PROBLEM

[Description of the Prior Art] It is known by plant sterol and plant sterol fatty acid ester for many years that the absorption depressant action of the cholesterol from a small intestine occurs, and it is used for them as a plasma cholesterol concentration fall agent. Absorption of cholesterol requires that cholesterol should dissolve in a bile acid micell. However, the amount of dissolutions to the bile acid of cholesterol is low, and most is in the condition of an emulsion.
[0003] On the other hand, an amount almost comparable as cholesterol also dissolves plant sterol and plant sterol fatty acid ester in a bile acid micell. Therefore, when cholesterol and plant sterol live together, the amount of dissolutions to the bile acid micell of cholesterol will decrease. Moreover, the absorption coefficient from the small intestine of plant sterol is low, since it remains in a small intestine lumen, the amount of dissolutions to the bile acid micell of cholesterol becomes [being restricted with as, and], and absorption of cholesterol will be controlled. Therefore, in the case of the Homo sapiens who is easy to be influenced of the cholesterol taken in from a meal, plant sterol and plant sterol fatty acid ester are clinically used as an effective plasma cholesterol fall agent.
[0004] That amount is very few, although this plant sterol and plant sterol fatty acid ester are contained in vegetable oil and fat, an soybean, wheat, etc. and it is taken in with the everyday meal. If a current Japanese's eating habits are looked at, in order to control absorption of the cholesterol from a meal, day about 1-2g [per] plant sterol is required of plant sterol conversion, and it is difficult to take in a lot of such plant sterol and plant sterol fatty acid ester with the usual Homo sapiens's meal. It considers as the approach of taking in efficiently the plant sterol which has such a function, and plant sterol fatty acid ester, and although the various food which used plant sterol and plant sterol fatty acid ester is proposed, the following is mentioned as a patent about an oil-in-water type emulsification object.
[0005] Although the food product based on a fat which is within the limits whenever [esterification / of a sterol / whose] are 40 thru/or 90% is proposed by JP,11-127779,A and oil-in-water type emulsification objects, such as mayonnaise and a dressing, are mentioned to it as this food product including at least 1% of the weight of the sterol equivalent, it is limited to the low oil dressing whose fat is about 33%, and is hard to say that emulsion stability is enough.
[0006] the [moreover, / international public presentation] — in a No. 99/48378 official report, the fats-and-oils constituent which made the fats and oils which contain diacylglycerol 15% of the weight or more dissolve thru/or distribute plant sterol 1.2 to 20% of the weight proposes — having — as this fats-and-oils constituent — a dressing, mayonnaise, and roast meat — hanging down — etc. — although the oil-in-water type emulsification object is mentioned — this oil-in-water type emulsification object — emulsion stability — enough — **** — it is hard to say.
[0007] Furthermore, although the salad dressing which has sterol ester, an emulsifier or hydrocolloid, and a fat crystal inhibitor, and its manufacture approach are proposed by JP,2000-127779,A, since a lot of emulsifiers and hydrocolloids for emulsification stabilization are blended, there is a problem that flavor and mouthfeel are bad.
[0008] Therefore, the purpose of this invention is an oil-in-water type emulsification object containing the plant sterol which has cholesterol absorption depressant action, and/or plant sterol fatty acid ester, and offering an oil-in-water type emulsification object especially suitable

as acid oil-in-water type emulsification objects, such as mayonnaise and a dressing, with stably sufficient flavor and stably sufficient mouthfeel has oil-in-water type emulsification for a long period of time.

[Translation done.]

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MEANS

[Means for Solving the Problem] this invention persons did the knowledge of the ability to attain the above-mentioned purpose by combining the enzyme processing yolk with plant sterol and/or plant sterol fatty acid ester as an emulsifier, as a result of repeating examination wholeheartedly that the above troubles about acid oil-in-water type emulsification objects, such as an oil-in-water type emulsification object containing plant sterol and/or plant sterol fatty acid ester especially mayonnaise, and a dressing, should be solved.
[0010] This invention was made based on the above-mentioned knowledge, and offers the oil-in-water type emulsification object characterized by plant sterol and/or plant sterol fatty acid ester, and containing the enzyme processing yolk.
[0011]
[Embodiment of the Invention] Hereafter, the oil-in-water type emulsification object of this invention is explained to a detail. The plant sterol used by this invention is a component which constitutes a vegetable cell membrane, and exists widely in vegetation. For example, there are some which made the origin legumes, such as seeds, such as cereals, such as corn and wheat, and Goma, and an soybean, the rapeseed, the coconut, and the cottonseed. Moreover, all can be used although there is plant stanol, such as plant sterol, such as beta sitosterol, campesterol, a BURASHIKA sterol, fucosterol, and an ergosterol, and beta-sitostanol, campestanol, in plant sterol.
[0012] Moreover, as plant sterol fatty acid ester, a ****** rare ****** ester object, the plant sterol fatty-acid-ester content fats and oils obtained by carrying out the esterification reaction of the above-mentioned plant sterol, a partial glyceride, and/or a triglyceride which are mentioned later under a non-solvent, using lipase or alkali as a catalyst are used for vegetation.
[0013] Although especially the fatty acid that constitutes the above-mentioned plant sterol fatty acid ester is not limited, the saturated fatty acid and/or unsaturated fatty acid of carbon numbers 4-24 are mentioned preferably, its saturated fatty acid and/or unsaturated fatty acid of carbon numbers 16-24 are [among these] desirable, and its unsaturated fatty acid of carbon numbers 16-24 is still more desirable.
[0014] The above-mentioned plant sterol fatty-acid-ester content fats and oils are explained further below. As the above-mentioned partial glyceride used for manufacture of the above-mentioned plant sterol fatty-acid-ester content fats and oils, a reaction monoglyceride, a distillation monoglyceride, diglyceride, the diglyceride extracted from natural fats and oils are mentioned.
[0015] moreover, as the above-mentioned triglyceride used for manufacture of the above-mentioned plant sterol fatty-acid-ester content fats and oils For example, the fats and oils with which a configuration fatty acid consists of the saturated fatty acid or unsaturated fatty acid of carbon numbers 4-24, concrete — palm oil and a palm — the palm system fats and oils of the melting point section in an olein super olein palm stearin palm — The Rau Lynne system fats and oils, SAL fat, and Xia fat, such as soybean oil, soybean salad oil, oleum rapae, rapeseed salad oil, cotton seed oil, cottonseed salad oil, safflower oil, a sunflower oil and high OREIKKU safflower oil, and a high OREIKKU sunflower oil, corn oil, rice bran oil, palm kernel oil, palm oil - Natural oil fat, such as mango fat, cacao butter, beef tallow, lard, fish oil, whale oil, and milk fat, Synthetic oil

fat, such as diglyceride and MCT (medium-chain-fatty-acid triglyceride), and the fats and oils which performed physical or chemical preparation, such as these hardened oil, a judgment oil, or an ester interchange, further can be used combining independence or two sorts or more. In these, it is desirable to use preferably 30 % of the weight or more and the thing contained 50% of the weight or more most preferably 45% of the weight or more still more preferably for the unsaturated fatty acid of carbon numbers 16-24 as a configuration fatty acid of the fats and oils to be used.

[0016] One sort chosen from a glycerol, fatty-acid lower alcohol ester, and a fatty acid according to the need other than the above-mentioned partial glyceride and/or a triglyceride or two sorts or more may be used. As the above-mentioned fatty-acid lower alcohol ester, although there is especially no limit, as for a fatty-acid part, what is the saturation or the unsaturated fatty acid of the saturation of carbon numbers 4-24 or unsaturated fatty acid, especially carbon numbers 16-24 is desirable, and an alcoholic part has that desirable whose boiling point of the alcohol of isolation is lower alcohol 100 degrees C or less when [, such as ethanol and a methanol,] it hydrolyzes. Moreover, although there is especially no limit also as the above-mentioned fatty acid, it is desirable to use the saturation or the unsaturated fatty acid of the saturation of carbon numbers 4-24 or unsaturated fatty acid, especially carbon numbers 16-24.

[0017] When using lipase as a catalyst in the above-mentioned esterification reaction, although especially the class is not restricted, as this lipase, it is desirable to use a thing without site selectivity. Specifically, it is Alcaligenes. A group and Chromobacterium A group and Pseudomonas The enzyme obtained from a group and a Humicola group is desirable, and it is Alcaligenes in this. A group and Chromobacterium A group and Pseudomonas The enzyme obtained from a group is still more desirable, and it is Alcaligenes. The enzyme obtained from a group is the most desirable. These enzymes may be fixed and used for support, such as the diatom earth, an alumina, ion exchange resin, activated carbon, and a ceramic, although it is also possible to use it with enzyme powder.

[0018] Moreover, when using lipase as a catalyst, since it makes hydrolysis of a reaction oil as low as possible that it is 500 ppm or less still more preferably and it can make low preferably 900 ppm or less of loss at a deordorization process, the moisture content of the system of reaction of the above-mentioned esterification reaction is desirable. Moreover, the above-mentioned esterification reaction can be performed under the conditions of ordinary pressure or reduced pressure.

[0019] Moreover, when using alkali as a catalyst in the above-mentioned esterification reaction, as this alkali, it is desirable to use a sodium methylate. When using a sodium methylate as a catalyst, after heating mixture with plant sterol, a partial glyceride, and/or a triglyceride at 80-100 degrees C and dehydrating to the moisture of 500 ppm or less, it is good to add a catalyst (sodium methylate) and to react under ordinary pressure or reduced pressure. Acids, such as a citric acid and a phosphoric acid, neutralize after esterification reaction termination, and rinsing and dehydration are performed. In addition, those who used lipase as a catalyst in this invention are [using alkali rather than] efficient and economical.

[0020] Moreover, when performing the above-mentioned esterification reaction by making above-mentioned lipase or alkali into a catalyst, it is desirable to perform a random ester interchange. Since plant sterol is esterified at random with a partial glyceride and/or the configuration fatty acid of TORIGURISEDO by performing a random ester interchange, the configuration fatty acid composition of plant sterol fatty acid ester and the configuration fatty acid composition of a triglyceride become the same substantially.

[0021] Solvents, such as a hexane and an acetone, or dry type judgment may remove the plant sterol of isolation from the plant sterol fatty-acid-ester content fats and oils obtained as mentioned above.

[0022] Moreover, plant sterol fatty-acid-ester content fats and oils are refined by the purification approach of the usual fats and oils, and the same approach. The purification approaches of the usual fats and oils here are bleaching and deordorization or deoxidation, bleaching, and deordorization. By refining, a smell peculiar to plant sterol is lost and flavor and the good plant sterol fatty-acid-ester content fats and oils of a color tone are obtained.

[0023] Although the plant sterol in the oil-in-water type emulsification object of this invention and/or especially the content of plant sterol fatty acid ester are not restricted, it is preferably good to consider as 1 - 20 % of the weight most preferably 0.5 to 30% of the weight still more preferably 0.1 to 40% of the weight at plant sterol conversion. If this content exceeds 40 % of the weight, mouthfeel of the oil-in-water type emulsification object obtained will become bad, and when this content takes in an oil-in-water type emulsification object at less than 0.1 % of the weight, on the other hand, a cholesterol fall operation will not fully be demonstrated.
[0024] In the oil-in-water type emulsification object of this invention, plant sterol and plant sterol fatty acid ester may be used independently, respectively, and you may use together. when using together, plant sterol (A) and especially weight ratio A/B with plant sterol fatty acid ester (B) limit — not having — for example, within the limits of 1000 / 1 - 1/1000 — desirable — 30 / 1 - 1/200 — what is necessary is just to use it still more preferably within the limits of 10 / 1 - 1/30
[0025] In addition to above-mentioned plant sterol and/or plant sterol fatty acid ester, the oil-in-water type emulsification object of this invention contains the enzyme processing yolk. If the yolk which is not processed with an enzyme is used, the emulsion stability of the oil-in-water type emulsification object obtained will become what was remarkably inferior.
[0026] As a substrate for preparing the above-mentioned enzyme processing yolk, fresh egg yellow, the sterilization yolk, the salting yolk, and the sugar-added yolk can be used. Moreover, in order to reduce the cholesterol in an oil-in-water type emulsification object, it is good also considering the yolk which reduced cholesterol as a substrate. Especially if it takes into consideration suppressing growth of the flavor of the oil-in-water type emulsification object obtained and the microorganism at the time of an enzyme reaction, the salting yolk is especially suitable, and it is good for using the salting yolk with which salt was added three to 20% of the weight to use the salting yolk with which salt was added five to 8% of the weight at best still more preferably.
[0027] In this invention, it is desirable to use together HOSUFO lipase A and a protease as an enzyme used in the case of enzyme processing of the yolk.
[0028] It is the enzyme which carries out the catalyst of the reaction which the above-mentioned HOSUFO lipase A is also called phospholipid hydrolase, and decomposes phospholipid into lysophospholipid. In this invention By the difference in the location of an ester bond which acts, two kinds, HOSUFO lipase A1 (EC3.1.1.32) and HOSUFO lipase A2 (EC3.1.1.4), can be used. for example, the optimal pH which made the origin the microorganism (for example, Aspergillus oryzae group) — HOSUFO lipase A1 of an acid range the optimal pH which made pancreatic juice of the mammals, such as a pig, the origin — HOSUFO lipase A2 of a weak base genital area etc. — commercial HOSUFO lipase A can be used.
[0029] It is the enzyme which carries out the catalyst of the reaction which understands protein a hydrolyzed part, and by this invention, commercial proteases, such as what made vegetation, the animal, and the microorganism the origin, for example, the bromelain which made the pineapple the origin, a papain which made the papaya the origin, a trypsin which made mammalian pancreatic juice the origin, a pepsin which made mammalian stomach juice the origin, and a protease of the mold origin, can be used for the above-mentioned protease, and especially its bromelain is the optimal.
[0030] As these enzymes, the enzyme of the powder or liquid of the food grade marketed can be used.
[0031] Although HOSUFO lipase A and a protease are the sequence of arbitration or can be added to coincidence in the case of enzyme processing of the yolk, it is desirable to carry out enzyme processing by the protease after the enzyme processing by HOSUFO lipase A from the point of avoiding hydrolysis of the HOSUFO lipase A by the protease.
[0032] The additions of HOSUFO lipase A are a 0.2 - 100 HOSUFO lipase unit and an amount which is still more preferably equivalent to the active mass of 0.5 - 20 HOSUFO lipase unit preferably to 1g of yolks. A HOSUFO lipase unit is a unit showing the active mass of HOSUFO lipase, and 1 HOSUFO lipase unit is an active mass which separates the fatty acid of one micromole in 1 minute after the phospholipid in the yolk, when HOSUFO lipase A is made to act

on the yolk at pH8.0 and 40 degrees C.
[0033] The additions of a protease are 0.01 - 10 protease unit and an amount which is still more preferably equivalent to the active mass of 0.1 - 5 protease unit preferably to 1g of yolks. A protease unit is a unit showing the active mass of a protease, and 1 protease unit is an active mass which shows whenever [coloration / which is equivalent to the thyrosin of one micromole in 1 minute], when a protease is made to act on milk casein at pH7.0 and 37 degrees C.
[0034] In addition, the enzyme which consists of concomitant use of HOSUFO lipase A and a protease may be added on the following criteria. namely, the addition (total quantity) of the above-mentioned enzyme — the yolk 100 weight section — receiving — desirable — the 0.001 - 0.8 weight section — it is the 0.01 - 0.3 weight section still more preferably. this time — the weight ratio of HOSUFO lipase A and a protease — desirable — 20 / 80 - 90/10 — it is 40 / 60 - 85/15 still more preferably.
[0035] Enzyme processing of the yolk is good for the protein, the HOSUFO lipase A, and the protease of the yolk not to denaturalize with heat, but to carry out with the optimum temperature of HOSUFO lipase A and a protease, and usually good to carry [20-60-degree C] out preferably in a 40-55-degree C temperature requirement. Moreover, stirring with an agitator etc. during enzyme processing is desirable.
[0036] Moreover, it is desirable the optimal pH of HOSUFO lipase A and a protease and to usually adjust to the range of pH 3-9 in the case of enzyme processing of the yolk. As a pH regulator of this purpose, especially if it is a food grade, it is not limited, for example, acid, such as acidulants, such as a lactic acid, a citric acid, a gluconic acid, an adipic acid, a succinic acid, a tartaric acid, a fumaric acid, a malic acid, a phosphoric acid, L-ascorbic acid, an acetic acid, and vinegar, a sodium dihydrogenphosphate, a potassium dihydrogenphosphate, vinegar, fruit juice, and fermented milk, a sodium hydroxide and a potassium hydroxide, a calcium hydroxide, a sodium citrate, sodium acetate, disodium hydrogenphosphate the potassium phosphate, phosphoric-acid 3 sodium, sodium ascorbate, etc. can be used. Moreover, calcium salts, such as mineral suitable as a stabilizer of an enzyme, for example, a calcium chloride, and calcium primary phosphate, may be added in the case of enzyme processing of the yolk.
[0037] Although there is especially no constraint in the reaction time in the case of enzyme processing of the yolk, it is desirable to carry out within the limits of 1 - 30 hours. In addition, although the approach of hydrolyzing according to above-mentioned conditions by the batch process as an approach of carrying out enzyme processing of the yolk is adopted, the approach of hydrolyzing with continuous system may be used.
[0038] Extent of the decomposition to the lysophospholipid of the phospholipid of the yolk by HOSUFO lipase A and extent of hydrolysis of the protein of the yolk by the protease are influenced [the addition of an enzyme, reaction temperature, pH at the time of reaction initiation, the existence of the stabilizer of an enzyme, and] of reaction time. Although especially extent of these decomposition is not limited in this invention, the decomposition to the lysophospholipid of the phospholipid of the yolk by HOSUFO lipase A is good to perform 25 - 100% of the total phosphorus lipid contained in the yolk even to extent decomposed into lysophospholipid, and hydrolysis of the protein of the yolk by the protease is good to perform the heating freezing characteristic of the protein contained in the yolk even to extent lost completely.
[0039] Thus, about the obtained enzyme processing yolk, it is good to carry out deactivation of the enzyme used for the enzyme reaction by the suitable approach, for example, heat-treatment.

[0040] The content of the above-mentioned enzyme processing yolk is good to consider as 3 - 12 % of the weight still more preferably one to 15% of the weight preferably among the oil-in-water type emulsification object of this invention from the point which there improves stabilization and flavor, and mouthfeel of oil-in-water type emulsification. The viscosity of the oil-in-water type emulsification object which will be obtained if there are too many these contents rises remarkably, and if there are too few these contents, oil-in-water type emulsification will become unstable.
[0041] As for the oil-in-water type emulsification object of this invention, it is desirable that

they are acid oil-in-water type emulsification objects, such as mayonnaise and a dressing.
[0042] The oil-in-water type emulsification object of this invention contains plant sterol and/or plant sterol fatty acid ester, and the enzyme processing yolk as an indispensable component, and although flavor and mouthfeel are good, since it gives mouthfeel and flavor which suited with the oil-in-water type emulsification object made into the purpose, the raw material of the arbitration used for the usual oil-in-water type emulsification mold food can be used for it in the range which does not spoil the purpose of this invention.
[0043] As such a raw material, for example palm oil — the inside of - palm olein super olein palm stearin palm — the melting point section, soybean oil, soybean salad oil, oleum rapae, rapeseed salad oil, cotton seed oil, and a cottonseed — salad oil, safflower oil, a sunflower oil, high OREIKKU safflower oil, and a high OREIKKU sunflower oil - Natural oil fat, such as corn oil, rice bran oil, palm kernel oil, palm oil, SAL fat, Xia fat, mango fat, cacao butter, beef tallow, lard, fish oil, whale oil, and milk fat, Synthetic oil fat, such as diglyceride and MCT (medium-chain-fatty-acid triglyceride), Physical or the fats and oils which performed chemical preparation, such as these hardened oil, a judgment oil, or an ester interchange, furthermore, independence, Or fats and oils, the cane sugar, the lactose, the grape sugar, the fruit sugar, the maltose, the maltooligosaccharide, the isomalt oligosaccharide, the fructo oligosaccharide, the galactosaccharide, the nigero-oligosaccharide, the starch syrup and paratinose trehalose which combined two or more sorts, Saccharides, such as a sorbitol maltitol mannitol, a reduction starch sugar ghost, and poly glucose, Dextrins, such as a straight chain dextrin, a branching dextrin, and an annular dextrin the modified starch and starch which process starch and starch with enzymes, such as an amylase, and are obtained — receiving — an acid and alkali treatment — chemical or the modified starch obtained by performing physical processing, such as - esterification, acetylation, formation of phosphoric-acid bridge formation, heating, and moist heat treatment, — Furthermore, the modified starch made to become a paste by heat-treatment beforehand so that it may be easy to dissolve these modified starch in water Fresh milk, cow's milk, other beast milk, condensed milk, sweetened condensed milk, a skimmilk, skimmilk powder, whole milk powder, casein casein sodium rennet casein, milk serum protein, a whey whey powder whey protein concentrate and butter, a buttermilk buttermilk powder cream and concentration cream total milk protein - Dairy products, such as milk calcium cream natural cheese process cheese and fermented milk, Protein, such as egg products, such as a whole egg, the yolk, albumens, and those powder, and soybean protein, gelatin, Various fruit juice, concentrated juice, a dried fruit, vegetable juice, pickles-in-vinegar vegetables, dehydrated vegetables, Seasonings, such as salts, such as refined salt, rock salt, a natural salt, a natural salt, and potassium chloride, and sodium glutamate sodium-succinate inosinic acid soda, a yeast extract, oceanic bonito extractives, HAP-HAV, spirits of wine, xanthan gum pectin locust-bean-gum gellant gum guar gum, and a tare — thickening stabilizers, such as a gun TOGAMU alginic acid, and sodium alginate curdlan, microfilament-like cellulose methyl cellulose, soybean polysaccharide, a lactic acid, a citric acid, and a gluconic acid — An adipic acid, a succinic acid, a tartaric acid, a fumaric acid, a malic acid, a phosphoric acid, L-ascorbic acid, Coloring agents, such as acidulants, such as an acetic acid and vinegar, a spice, a spice extract, and beta carotene, Antioxidants, such as a tocopherol, L-ascorbyl stearate, and a L-ascorbic acid palmitic-acid ester tea extract, the charge of bitterness, preservatives, a reinforcement, perfume, etc. are mentioned, and it can be used for arbitration.
[0044] Although an oil-in-water type is made to emulsify in case the above-mentioned raw material is blended with the oil-in-water type emulsification object of this invention since a water-soluble raw material is dissolved in the aqueous phase and an oil solubility raw material is usually dissolved in an oil phase, an oil phase may be made to distribute a water-soluble raw material, and you may emulsify to an oil-in-water type. The oil-in-water type emulsification objects of this invention are [20 - 90 % of the weight of aqueous phase, and 80 - 10 % of the weight of oil phases] 30 - 80 % of the weight of aqueous phase, and 70 - 20 % of the weight of oil phases most preferably still more preferably comparatively preferably [oil phase / the aqueous phase and] 25 - 85 % of the weight of aqueous phase, and 75 - 15 % of the weight of oil phases.

[0045] The oil-in-water type emulsification object of this invention can be manufactured as follows, for example. Plant sterol and/or plant sterol fatty acid ester are made to contain modified starch, a thickening stabilizer, etc. if needed, and it considers as an oil phase, and water is made to contain spices, such as saccharides, such as acidulants, such as vinegar, salt, and a starch syrup, and pepper, the enzyme processing yolk and if needed, and it considers as the aqueous phase. Subsequently, the above-mentioned oil phase is added stirring the above-mentioned aqueous phase, and an oil-in-water type preliminary emulsification object is obtained. This is processed with homogenization machines, such as emulsifiers, such as a colloid mill, and a homogenizer, finishing emulsification is performed, and the oil-in-water type emulsification object of this invention is obtained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example] Next, although an example and the example of a comparison are given and this invention is further explained to a detail, these do not restrict this invention at all.
[0047] (Example 1) HOSUFO lipase A20.015kg (555000 HOSUFO lipase unit) of the pancreatic juice origin of a pig was added to 100kg of salting yolks which adjusted the salting yolk to pH8.2 by the sodium hydroxide 7.5%, it processed at 40 degrees C for 7 hours, subsequently bromelain 0.003kg (90000 protease unit) was added, and it processed at 40 degrees C for 4 hours, it cooled to 5 degrees C, and the enzyme processing yolk (I) was obtained. Next, the water 7.5 weight section, the starch syrup (25 % of the weight of moisture) 4 weight section, the brewing vinegar 4 weight section, the rock salt 2 weight section, the sodium glutamate 0.2 weight section, the mustard seed powder 0.3 weight section, and the above-mentioned enzyme processing (yolk I) 7 weight section were mixed, and the aqueous phase was prepared. The plant sterol 2 weight section was independently dissolved in the heated soybean salad oil 73 weight section, and the oil phase was prepared. Subsequently, the above-mentioned oil phase was added stirring the above-mentioned aqueous phase, the oil-in-water type preliminary emulsification object was obtained, this was emulsified in the colloid mill and the oil-in-water type emulsification object of this invention was obtained. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.
[0048] (Example 2) Alcaligenes which is lipase without site selectivity after dissolving the plant sterol 10 weight section of the soybean origin in the heated oleum rapae 90 weight section The lipase 1 weight section of the group origin was added, at 65 degrees C, the moisture of the system of reaction was adjusted to 200 ppm, and the ester exchange reaction was performed. Subsequently, lipase was filtered and removed, the clay 2 weight section was added and bleached, it deodorized at the temperature of 200 degrees C, and plant sterol fatty-acid-ester content fats and oils (I) were obtained. The presentations of these fats and oils (I) were 15 % of the weight of plant sterol fatty acid ester, 1 % of the weight of monoglycerides, 12 % of the weight of diglycerides, 71 % of the weight of triglycerides, and 1 % of the weight of unreacted plant sterol. The fatty acid composition of the plant sterol fatty acid ester of these fats and oils (I), a triglyceride, and diglyceride was shown in the following table 1. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 except having used the above-mentioned plant sterol fatty-acid-ester content fats and oils (I) instead of the oil phase of an example 1. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.
[0049] HOSUFO lipase A1 0.02kg (800000 HOSUFO lipase unit) of the Aspergillus oryzae group origin is added to 100kg of salting yolks which added 7kg of water, and 3kg of brewing vinegar to 90kg of salting yolks 8%, and were adjusted to pH4.6. (Example 3) It processed at 45 degrees C for 7 hours, and subsequently bromelain 0.005kg (150000 protease unit) was added, and it processed at 45 degrees C for 3 hours, it cooled to 5 degrees C, and the enzyme processing

yolk (II) was obtained. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 instead of the enzyme processing yolk (I) of an example 1 except having used the above-mentioned enzyme processing yolk (II). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0050] (Example 4) The same processing as an example 2 was performed after dissolving the plant sterol 10 weight section of the soybean origin in the heated palm olein 90 weight section, and plant sterol fatty-acid-ester content fats and oils (II) were obtained. The presentations of these fats and oils (II) were 14 % of the weight of plant sterol fatty acid ester, 1 % of the weight of monoglycerides, 12 % of the weight of diglycerides, 72 % of the weight of triglycerides, and 1 % of the weight of unreacted plant sterol. The fatty acid composition of the plant sterol fatty acid ester of these fats and oils (II), a triglyceride, and diglyceride was shown in the following table 1. Next, the oil-in-water type emulsification object of this invention was obtained like the example 1 except having used the above-mentioned plant sterol fatty-acid-ester content fats and oils (II) instead of the oil phase of an example 1. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0051] The water 39.58 weight section, the grape sugar fruit-sugar liquid-sugar (25 % of the weight of moisture) 8 weight section, (Example 5) The granulated sugar 2 weight section, the 50% fermented milk acid 0.5 weight section, the lemon fruit-juice 1 weight section, The brewing vinegar 4 weight section, the refined salt 1.5 weight section, the succinic-acid disodium crystal 0.01 weight section, the curry powder 2 weight section, the mustard seed powder 0.2 weight section, the powder pepper 0.01 weight section, and the above-mentioned enzyme processing (yolk I) 8 weight section were mixed, and the aqueous phase was prepared. Independently, in the above-mentioned plant sterol fatty-acid-ester content (fats-and-oils I) 30 weight section, the modified starch 3 weight section, the xanthan gum 0.1 weight section, and the Calais flavor 0.1 weight section which became a paste potato starch after phosphoric-acid bridge formation were distributed and dissolved, and the oil phase was prepared. Subsequently, the above-mentioned oil phase was added stirring the above-mentioned aqueous phase, the oil-in-water type preliminary emulsification object was obtained, this was homogenized by the homogenization pressure force of 20MPa(s) with the homogenizer, and the oil-in-water type emulsification object of this invention was obtained. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0052] (Example 1 of a comparison) The oil-in-water type emulsification object was obtained like the example 1 except having used the salting yolk 7.5% instead of the enzyme processing yolk (I). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, it was destroyed and the oil separated oil-in-water type emulsification. Moreover, this oil-in-water type emulsification object was what is inferior in flavor and mouthfeel.

[0053] (Example 2 of a comparison) The oil-in-water type emulsification object was obtained like the example 5 except having used the salting yolk 7.5% instead of the enzyme processing yolk (I). When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, it was destroyed and the oil separated oil-in-water type emulsification. Moreover, this oil-in-water type emulsification object was what is inferior in flavor and mouthfeel.

[0054] (Example 6) The same processing as an example 2 is performed after dissolving the plant sterol 43 weight section of the soybean origin in the mixture of the heated oleum rapae 19 weight section and the ethyl oleate ester 38 weight section, and it is plant sterol fatty-acid-ester content fats and oils (III). It obtained. These fats and oils (III) Presentations were 76 % of the weight of plant sterol fatty acid ester, 0 % of the weight of monoglycerides, 4 % of the weight

of diglycerides, 17 % of the weight of triglycerides, and 3 % of the weight of unreacted plant sterol. These fats and oils (III) The fatty acid composition of plant sterol fatty acid ester, a triglyceride, and diglyceride was shown in the following table 1. Next, it is the above-mentioned plant sterol fatty-acid-ester content fats and oils (III) instead of plant sterol fatty-acid-ester content fats and oils (I). The oil-in-water type emulsification object of this invention was obtained like the example 5 except having used. When this oil-in-water type emulsification object was stirred by Spa Chela after 24-hour refrigeration in the 5-degree C refrigerator, destruction of oil-in-water type emulsification was not seen, but emulsification was stable. Moreover, flavor and mouthfeel of this oil-in-water type emulsification object were good.

[0055]

[Table 1]

(単位：重量%)

	植物ステロール脂肪酸エステル含有油脂		
	(I)	(II)	(III)
トリグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	59	60	90
C18:2	22	21	6
others	13	13	3
植物ステロール脂肪酸エステルの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	57	59	91
C18:2	22	22	5
others	15	13	3
ジグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	58	60	91
C18:2	22	22	4
others	14	12	4

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最終頁に続く

(54)【発明の名称】　水中油型乳化物

(57)【要約】
【課題】　コレステロール吸収抑制作用を有する植物ステロール及び／又は植物ステロール脂肪酸エステルを含有する水中油型乳化物であって、長期間水中油型乳化が安定で且つ風味と食感の良い、特にマヨネーズ、ドレッシング等の酸性水中油型乳化物として好適な水中油型乳化物を提供すること。
【解決手段】　水中油型乳化物に、植物ステロール及び／又は植物ステロール脂肪酸エステルと、酵素処理卵黄を含有させる。

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【特許請求の範囲】

【請求項１】　植物ステロール及び／又は植物ステロール脂肪酸エステルと、酵素処理卵黄を含有することを特徴とする水中油型乳化物。

【請求項２】　植物ステロール及び／又は植物ステロール脂肪酸エステルを、植物ステロール換算で０．１～４０重量%含有する請求項１記載の水中油型乳化物。

【請求項３】　酵素処理卵黄を１～１５重量%含有する請求項１又は２記載の水中油型乳化物。

【請求項４】　酵素処理卵黄が、卵黄をホスフォリパーゼＡ及びプロテアーゼで処理することにより得られた酵素処理卵黄である請求項１～３の何れかに記載の水中油型乳化物。

【請求項５】　酸性水中油型乳化物である請求項１～４の何れかに記載の水中油型乳化物。

【請求項６】　植物ステロール及び／又は植物ステロール脂肪酸エステルを含有する油相と、酵素処理卵黄を含有する水相とを乳化することを特徴とする水中油型乳化物の製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、植物ステロール及び／又は植物ステロール脂肪酸エステルを含む水中油型乳化物に関するものであり、本発明の水中油型乳化物は、特にマヨネーズ、ドレッシング等の酸性水中油型乳化物として好適なものである。

【０００２】

【従来の技術及び発明が解決しようとする課題】植物ステロールや植物ステロール脂肪酸エステルには小腸からのコレステロールの吸収抑制作用があることが古くから知られており、血漿コレステロール濃度低下剤として用いられている。コレステロールの吸収は、コレステロールが胆汁酸ミセルへ溶解することが必要である。しかし、コレステロールの胆汁酸への溶解量は低く、大部分はエマルジョンの状態にある。

【０００３】一方、植物ステロールや植物ステロール脂肪酸エステルもコレステロールとほぼ同程度の量が胆汁酸ミセルへ溶解する。従って、コレステロールと植物ステロールが共存すると、コレステロールの胆汁酸ミセルへの溶解量が減少することになる。また、植物ステロールの小腸からの吸収率は低く、小腸内腔に残存するため、コレステロールの胆汁酸ミセルへの溶解量は制限されたままとなり、コレステロールの吸収が抑制されることとなる。従って、食事から摂取されるコレステロールの影響を受けやすいヒトの場合、植物ステロールや植物ステロール脂肪酸エステルは有効な血漿コレステロール低下剤として、臨床的に利用されている。

【０００４】この植物ステロールや植物ステロール脂肪酸エステルは、植物油脂や大豆、小麦等に含まれており、日常の食事で摂取されているが、その量はごく僅かなものである。現在の日本人の食生活を見てみると、食事からのコレステロールの吸収を抑制するためには、植物ステロール換算で１日約１～２ｇの植物ステロールが必要であり、通常のヒトの食事でそのような多量の植物ステロールや植物ステロール脂肪酸エステルを摂取することは困難である。この様な機能を有する植物ステロールや植物ステロール脂肪酸エステルを効率良く摂取する方法として、植物ステロールや植物ステロール脂肪酸エステルを使用した各種食品が提案されているが、水中油型乳化物に関する特許としては以下の様なものが挙げられる。

【０００５】特開平１１－１２７７７９号公報には、少なくとも１重量%のステロール同等物を含み、ステロールのエステル化度が４０乃至９０%の範囲内である、脂肪に基づく食品生成物が提案され、該食品生成物として、マヨネーズ、ドレッシング等の水中油型乳化物が挙げられているが、脂肪が３３%程度の低油分ドレッシングに限定されており、また乳化安定性が十分とは言い難い。

【０００６】また、国際公開第９９／４８３７８号公報には、ジアシルグリセロールを１５重量%以上含有する油脂に植物ステロールを１．２～２０重量%溶解ないし分散させた油脂組成物が提案され、該油脂組成物として、ドレッシング、マヨネーズ、焼き肉のたれ等の水中油型乳化物が挙げられているが、この水中油型乳化物も乳化安定性が十分とは言い難い。

【０００７】更に、特開２０００－１２７７７９号公報には、ステロールエステルと、乳化剤又はハイドロコロイドと、脂肪結晶抑制剤とを有するサラダドレッシング及びその製造方法が提案されているが、乳化安定化のために多量の乳化剤やハイドロコロイドが配合されるため、風味と食感が悪いという問題がある。

【０００８】従って、本発明の目的は、コレステロール吸収抑制作用を有する植物ステロール及び／又は植物ステロール脂肪酸エステルを含有する水中油型乳化物であって、長期間水中油型乳化が安定で且つ風味と食感の良い、特にマヨネーズ、ドレッシング等の酸性水中油型乳化物として好適な水中油型乳化物を提供することにある。

【０００９】

【課題を解決するための手段】本発明者らは、植物ステロール及び／又は植物ステロール脂肪酸エステルを含む水中油型乳化物、特にマヨネーズ、ドレッシング等の酸性水中油型乳化物に関する前述の様な問題点を解決すべく鋭意検討を重ねた結果、植物ステロール及び／又は植物ステロール脂肪酸エステルと、乳化剤として酵素処理卵黄とを組み合わせることによって、上記目的を達成し得ることを知見した。

【００１０】本発明は、上記知見に基づきなされたもので、植物ステロール及び／又は植物ステロール脂肪酸エ

ステルと、酵素処理卵黄を含有することを特徴とする水中油型乳化物を提供するものである。

【0011】

【発明の実施の形態】以下、本発明の水中油型乳化物について詳細に説明する。本発明で使用される植物ステロールは、植物の細胞膜を構成する成分であり、植物中に広く存在している。例えばトウモロコシや小麦等の穀類、ゴマ等の種実類、大豆等の豆類、菜種、ヤシ、綿実を起源としたもの等がある。また、植物ステロールには、β-シトステロール、カンペステロール、ブラシカステロール、フコステロール、エルゴステロール等の植物ステロールや、β-シトスタノール、カンペスタノール等の植物スタノールがあるが、何れも使用することができる。

【0012】また、植物ステロール脂肪酸エステルとしては、植物に微量含まれているエステル体や、後述するような、上記植物ステロールと部分グリセリド及び／又はトリグリセリドとを無溶媒下でリパーゼ又はアルカリを触媒としてエステル化反応することにより得られる植物ステロール脂肪酸エステル含有油脂等が用いられる。

【0013】上記植物ステロール脂肪酸エステルを構成する脂肪酸は、特に限定されないが、好ましくは炭素数4～24の飽和脂肪酸及び／又は不飽和脂肪酸が挙げられ、これらのうち炭素数16～24の飽和脂肪酸及び／又は不飽和脂肪酸が好ましく、更に炭素数16～24の不飽和脂肪酸が好ましい。

【0014】上記植物ステロール脂肪酸エステル含有油脂について以下に更に説明する。上記植物ステロール脂肪酸エステル含有油脂の製造に用いられる上記部分グリセリドとしては、反応モノグリセリド、蒸留モノグリセリド、ジグリセリド、天然の油脂から抽出したジグリセリド等が挙げられる。

【0015】また、上記植物ステロール脂肪酸エステル含有油脂の製造に用いられる上記トリグリセリドとしては、例えば構成脂肪酸が炭素数4～24の飽和脂肪酸又は不飽和脂肪酸からなる油脂、具体的にはパーム油・パームオレイン・スーパーオレイン・パームステアリン・パーム中融点部のパーム系油脂、大豆油・大豆サラダ油・菜種油・菜種サラダ油・綿実油・綿実サラダ油・サフラワー油・サンフラワー油・ハイオレイックサフラワー油・ハイオレイックサンフラワー油・コーン油・米糠油・パーム核油・ヤシ油等のラウリン系油脂・サル脂・シア脂・マンゴ脂・カカオ脂・牛脂・豚脂・魚油・鯨油・乳脂等の天然油脂、ジグリセリド・MCT（中鎖脂肪酸トリグリセリド）等の合成油脂、更にこれらの硬化油、分別油、あるいはエステル交換等の物理的又は化学的処理を施した油脂類を単独、又は2種以上を組合わせて用いることができる。これらの中では、使用する油脂の構成脂肪酸として、炭素数16～24の不飽和脂肪酸を好ましくは30重量%以上、更に好ましくは45重量%以上、最も好ましくは50重量%以上含有するものを使用するのが好ましい。

【0016】上記の部分グリセリド及び／又はトリグリセリドの他に、必要によりグリセリン、脂肪酸低級アルコールエステル及び脂肪酸から選ばれた1種又は2種以上を使用しても良い。上記脂肪酸低級アルコールエステルとしては、特に制限はないが、脂肪酸部分は炭素数4～24の飽和又は不飽和脂肪酸、特に炭素数16～24の飽和又は不飽和脂肪酸であるものが好ましく、またアルコール部分は、エタノール、メタノール等の、加水分解されたときに遊離のアルコールの沸点が100℃以下の低級アルコールであるものが好ましい。また、上記脂肪酸としても特に制限はないが、炭素数4～24の飽和又は不飽和脂肪酸、特に炭素数16～24の飽和又は不飽和脂肪酸を用いるのが好ましい。

【0017】上記エステル化反応において触媒としてリパーゼを用いる場合、該リパーゼとしては、その種類は特に制限されないが、位置選択性が無いものを使用するのが好ましい。具体的にはAlcaligenes 属、Chromobacterium 属、Pseudomonas 属、Humicola属から得られる酵素等が好ましく、この中で、Alcaligenes 属、Chromobacterium 属、Pseudomonas 属から得られる酵素等が更に好ましく、Alcaligenes 属から得られる酵素が最も好ましい。これらの酵素は、酵素粉末のままで使用することも可能であるが、ケイソウ土、アルミナ、イオン交換樹脂、活性炭、セラミック等の担体に固定化して用いても良い。

【0018】また、触媒としてリパーゼを用いる場合、上記エステル化反応の反応系の水分量は、好ましくは900ppm以下、更に好ましくは500ppm以下であることが、反応油の加水分解をできるだけ低くし、脱臭工程での損失を低くできるため望ましい。また、上記エステル化反応は常圧又は減圧の条件下で行なうことができる。

【0019】また、上記エステル化反応において触媒としてアルカリを用いる場合、該アルカリとしては、ソジウムメチラートを使用するのが好ましい。ソジウムメチラートを触媒として使用する場合、植物ステロールと部分グリセリド及び／又はトリグリセリドとの混合物を80～100℃に加熱し、500ppm以下の水分まで脱水した後、触媒（ソジウムメチラート）を添加し、常圧又は減圧下で反応を行うのがよい。エステル化反応終了後、クエン酸、リン酸等の酸で中和し、水洗、脱水を行う。尚、本発明では、触媒としてリパーゼを使用した方が、アルカリを使用するよりも効率的且つ経済的である。

【0020】また、上記のリパーゼ又はアルカリを触媒として上記エステル化反応を行う場合、ランダムエステル交換を行うのが好ましい。ランダムエステル交換を行うことにより、植物ステロールが、部分グリセリド及び

／又はトリグリセドの構成脂肪酸でランダムにエステル化されるため、植物ステロール脂肪酸エステルの構成脂肪酸組成とトリグリセリドの構成脂肪酸組成とが実質的に同一になる。

【００２１】上述のようにして得られた植物ステロール脂肪酸エステル含有油脂から、ヘキサンやアセトン等の溶剤又は乾式分別によって、遊離の植物ステロールを除去しても良い。

【００２２】また、植物ステロール脂肪酸エステル含有油脂は、通常の油脂の精製方法と同様の方法によって精製される。ここでいう通常の油脂の精製方法とは、漂白及び脱臭、又は脱酸、漂白及び脱臭のことである。精製を行うことで、植物ステロール特有の臭いが無くなり、風味、色調の良好な植物ステロール脂肪酸エステル含有油脂が得られる。

【００２３】本発明の水中油型乳化物中における植物ステロール及び／又は植物ステロール脂肪酸エステルの含有量は特に制限されないが、植物ステロール換算で好ましくは０．１～４０重量%、更に好ましくは０．５～３０重量%、最も好ましくは１～２０重量%とするのが良い。該含有量が４０重量%を超えると、得られる水中油型乳化物の食感が悪いものとなり、一方、該含有量が０．１重量%未満では、水中油型乳化物を摂取した時に、コレステロール低下作用が十分に発揮されない。

【００２４】本発明の水中油型乳化物においては、植物ステロール及び植物ステロール脂肪酸エステルをそれぞれ単独で使用しても良いし、併用しても良い。併用する場合、植物ステロール（Ａ）と、植物ステロール脂肪酸エステル（Ｂ）との重量比率Ａ／Ｂは特に限定されず、例えば１０００／１～１／１０００の範囲内、好ましくは３０／１～１／２００、更に好ましくは１０／１～１／３０の範囲内で使用すれば良い。

【００２５】本発明の水中油型乳化物は、上記の植物ステロール及び／又は植物ステロール脂肪酸エステルに加えて、酵素処理卵黄を含有する。酵素で処理しない卵黄を用いると、得られる水中油型乳化物の乳化安定性が著しく劣ったものとなる。

【００２６】上記酵素処理卵黄を調製するための基質としては、生卵黄、殺菌卵黄、加塩卵黄、加糖卵黄を使用することができる。また、水中油型乳化物中のコレステロールを低減するために、コレステロールを低減した卵黄を基質としても良い。得られる水中油型乳化物の風味や、酵素反応時の微生物の増殖を抑えることを考慮すると特に加塩卵黄が適しており、特に食塩が３～２０重量%添加された加塩卵黄を用いるのが良く、更に好ましくは食塩が５～８重量%添加された加塩卵黄を用いるのが良い。

【００２７】本発明において、卵黄の酵素処理の際に用いる酵素としては、ホスフォリパーゼＡ及びプロテアーゼを併用することが好ましい。

【００２８】上記ホスフォリパーゼＡは、リン脂質加水分解酵素とも呼ばれ、リン脂質をリゾリン脂質に分解する反応を触媒する酵素であり、本発明では、作用するエステル結合の位置の違いにより、ホスフォリパーゼA_1（ＥＣ３．１．１．３２）とホスフォリパーゼA_2（ＥＣ３．１．１．４）の２種類を使用することができ、例えば微生物（例えばAspergillus oryzae属）を起源とした至適ｐＨが酸性域のホスフォリパーゼA_1や、豚等の哺乳類の膵液を起源とした至適ｐＨが弱塩基性域のホスフォリパーゼA_2等の、市販のホスフォリパーゼＡを使用することができる。

【００２９】上記プロテアーゼは、蛋白質を加水分解分解する反応を触媒する酵素であり、本発明では、植物、動物、微生物を起源としたもの、例えばパイナップルを起源としたブロメライン、パパイヤを起源としたパパイン、哺乳類の膵液を起源としたトリプシン、哺乳類の胃液を起源としたペプシン、カビ由来のプロテアーゼ等、市販のプロテアーゼを使用することができ、特にブロメラインが最適である。

【００３０】これらの酵素としては、市販されている食品用の、粉末又は液体の酵素を使用することができる。

【００３１】卵黄の酵素処理の際、ホスフォリパーゼＡ及びプロテアーゼは、任意の順序で又は同時に添加することができるが、プロテアーゼによるホスフォリパーゼＡの加水分解を避ける点から、ホスフォリパーゼＡによる酵素処理後、プロテアーゼによる酵素処理をするのが好ましい。

【００３２】ホスフォリパーゼＡの添加量は、卵黄１ｇに対し、好ましくは０．２～１００ホスフォリパーゼユニット、更に好ましくは０．５～２０ホスフォリパーゼユニットの活性量に相当する量である。ホスフォリパーゼユニットとは、ホスフォリパーゼの活性量を表す単位であり、１ホスフォリパーゼユニットとは、ｐＨ８．０、４０℃で卵黄にホスフォリパーゼＡを作用させた時に、卵黄中のリン脂質から、１分間に１マイクロモルの脂肪酸を遊離する活性量である。

【００３３】プロテアーゼの添加量は、卵黄１ｇに対し、好ましくは０．０１～１０プロテアーゼユニット、更に好ましくは０．１～５プロテアーゼユニットの活性量に相当する量である。プロテアーゼユニットとは、プロテアーゼの活性量を表す単位であり、１プロテアーゼユニットとは、ｐＨ７．０、３７℃でミルクカゼインにプロテアーゼを作用させた時に、１分間に１マイクロモルのチロシンに相当する呈色度を示す活性量である。

【００３４】尚、ホスフォリパーゼＡ及びプロテアーゼの併用からなる酵素は、次の様な基準で添加しても良い。即ち、上記酵素の添加量（合計量）は、卵黄１００重量部に対し、好ましくは０．００１～０．８重量部、更に好ましくは０．０１～０．３重量部である。このとき、ホスフォリパーゼＡとプロテアーゼとの重量比は、

好ましくは２０／８０～９０／１０、更に好ましくは４０／６０～８５／１５である。

【００３５】卵黄の酵素処理は、卵黄の蛋白質やホスフォリパーゼA及びプロテアーゼが熱により変性せず、ホスフォリパーゼA及びプロテアーゼの最適温度で行うのが良く、通常２０～６０℃、好ましくは４０～５５℃の温度範囲で行うのが良い。また、酵素処理中に攪拌機等で攪拌を行うのが好ましい。

【００３６】また、卵黄の酵素処理の際に、ホスフォリパーゼAとプロテアーゼの至適ｐＨ、通常ｐＨ３～９の範囲に調整することが好ましい。この目的のｐＨ調整剤としては、食品用であれば特に限定されず、例えば乳酸、クエン酸、グルコン酸、アジピン酸、コハク酸、酒石酸、フマル酸、リンゴ酸、リン酸、Ｌ－アスコルビン酸、酢酸、酢等の酸味料やリン酸二水素ナトリウム、リン酸二水素カリウム、食酢、果汁、発酵乳等の酸性物質や、水酸化ナトリウム、水酸化カリウム、水酸化カルシウム、クエン酸ナトリウム、酢酸ナトリウム、リン酸水素二ナトリウム、リン酸水素二カリウム、リン酸三ナトリウム、アスコルビン酸ナトリウム等を用いることができる。また、卵黄の酵素処理の際に、酵素の安定剤として適当な無機塩類、例えば塩化カルシウム、リン酸二水素カルシウム等のカルシウム塩を添加しても良い。

【００３７】卵黄の酵素処理の際の反応時間に特に制約はないが、１～３０時間の範囲内で行うのが好ましい。尚、卵黄を酵素処理する方法としては、回分式で上述の条件により加水分解する方法が採用されるが、連続式で加水分解する方法でもよい。

【００３８】ホスフォリパーゼAによる卵黄のリン脂質のリゾリン脂質への分解の程度と、プロテアーゼによる卵黄の蛋白質の加水分解の程度は、酵素の添加量、反応温度、反応開始時のｐＨ、酵素の安定剤の有無、反応時間の影響を受ける。本発明では、これらの分解の程度は特に限定されないが、ホスフォリパーゼAによる卵黄のリン脂質のリゾリン脂質への分解は、卵黄に含まれる全リン脂質の２５～１００％がリゾリン脂質に分解される程度にまで行われるのが良く、またプロテアーゼによる卵黄の蛋白質の加水分解は、卵黄に含まれる蛋白質の加熱凝固性が完全に失われる程度にまで行われるのが良い。

【００３９】この様にして得られた酵素処理卵黄については、適当な方法、例えば加熱処理によって、酵素反応に使用した酵素を失活させるのが良い。

【００４０】上記酵素処理卵黄の含有量は、水中油型乳化の安定化及び風味や食感を良くする点から、本発明の水中油型乳化物中、好ましくは１～１５重量%、更に好ましくは３～１２重量%とするのが良い。該含有量が多すぎると、得られる水中油型乳化物の粘度が著しく上昇し、また該含有量が少なすぎると、水中油型乳化が不安定となる。

【００４１】本発明の水中油型乳化物は、マヨネーズ、ドレッシング等の酸性水中油型乳化物であることが好ましい。

【００４２】本発明の水中油型乳化物は、植物ステロール及び／又は植物ステロール脂肪酸エステルと、酵素処理卵黄とを必須成分として含有し、風味と食感の良いものであるが、目的とする水中油型乳化物により合った食感や風味を与えるため、本発明の目的を損なわない範囲で、通常の水中油型乳化型食品に使用される任意の原料を使用することができる。

【００４３】このような原料としては、例えば、パーム油・パームオレイン・スーパーオレイン・パームステアリン・パーム中融点部・大豆油・大豆サラダ油・菜種油・菜種サラダ油・綿実油・綿実サラダ油・サフラワー油・サンフラワー油・ハイオレイックサフラワー油・ハイオレイックサンフラワー油・コーン油・米糠油・パーム核油・ヤシ油・サル脂・シア脂・マンゴ脂・カカオ脂・牛脂・豚脂・魚油・鯨油・乳脂等の天然油脂、ジグリセリド・ＭＣＴ（中鎖脂肪酸トリグリセリド）等の合成油脂、更にこれらの硬化油、分別油、あるいはエステル交換等の物理的又は化学的処理を施した油脂類を単独、又は２種以上を組合わせた油脂類、ショ糖・乳糖・ブドウ糖・果糖・麦芽糖・マルトオリゴ糖・イソマルトオリゴ糖・フラクトオリゴ糖・ガラクトオリゴ糖・ニゲロオリゴ糖・水飴・パラチノース・トレハロース、ソルビトール・マルチトール・マンニトール・還元澱粉糖化物・ポリデキストロース等の糖類、直鎖デキストリン・分枝デキストリン・環状デキストリン等のデキストリン類、澱粉、澱粉をアミラーゼ等の酵素で処理して得られる化工澱粉類、澱粉に対して酸やアルカリ処理・エステル化・アセチル化・リン酸架橋化・加熱・湿熱処理等の化学的又は物理的処理を行なって得られる化工澱粉類、更にこれら化工澱粉を水に溶解し易いように予め加熱処理により糊化させた化工澱粉類、生乳・牛乳・その他獣乳・練乳・加糖練乳・脱脂乳・脱脂粉乳・全脂粉乳・カゼイン・カゼインナトリウム・レンネットカゼイン・乳清蛋白質・ホエー・ホエーパウダー・ホエー蛋白質濃縮物・バター・バターミルク・バターミルクパウダー・クリーム・濃縮クリーム・トータルミルクプロテイン・ミルクカルシウム・クリーム・ナチュラルチーズ・プロセスチーズ・発酵乳等の乳製品、全卵・卵黄・卵白及びそれらの粉末等の卵製品、大豆蛋白質・ゼラチン等の蛋白質、各種果汁、濃縮果汁、乾燥果実、野菜ジュース、酢漬野菜、乾燥野菜、精製塩・岩塩・天然塩・自然塩・塩化カリウム等の塩類、グルタミン酸ナトリウム・コハク酸ナトリウム・イノシン酸ソーダ・酵母エキス・鰹エキス・ＨＡＰ・ＨＡＶ等の調味料、酒精、キサンタンガム・ペクチン・ローカストビーンガム・ジェランガム・グアーガム・タラガントガム・アルギン酸・アルギン酸ナトリウム・カードラン・微小繊維状セルロース・メチルセル

ロース・大豆多糖類等の増粘安定剤、乳酸、クエン酸、グルコン酸、アジピン酸、コハク酸、酒石酸、フマル酸、リンゴ酸、リン酸、Ｌ－アスコルビン酸、酢酸、酢等の酸味料、香辛料、香辛料抽出物、βカロチン等の着色料、トコフェロール・Ｌ－アスコルビン酸ステアリン酸エステル・Ｌ－アスコルビン酸パルミチン酸エステル・チャ抽出物等の酸化防止剤、苦味料、保存料、強化剤、香料等が挙げられ、任意に使用することができる。

【００４４】上記原料を本発明の水中油型乳化物に配合する際には、通常、水溶性の原料を水相に、油溶性の原料を油相に溶解させてから水中油型に乳化させるが、水溶性の原料を油相に分散させて水中油型に乳化しても良い。本発明の水中油型乳化物は、水相と油相との割合が、好ましくは水相２０～９０重量%と油相８０～１０重量%、さらに好ましくは水相２５～８５重量%と油相７５～１５重量%、最も好ましくは水相３０～８０重量%と油相７０～２０重量%である。

【００４５】本発明の水中油型乳化物は、例えば、次のようにして製造することができる。植物ステロール及び／又は植物ステロール脂肪酸エステルに必要に応じて化工澱粉、増粘安定剤等を含有させて油相とし、また、水に酵素処理卵黄及び必要に応じて食酢等の酸味料、食塩、水飴等の糖類、コショウ等の香辛料を含有させて水相とする。次いで、上記水相を撹拌しつつ上記油相を加え、水中油型予備乳化物を得る。これをコロイドミル等の乳化機、ホモゲナイザー等の均質化機で処理し仕上げ乳化を行い、本発明の水中油型乳化物を得る。

【００４６】

【実施例】次に、実施例及び比較例を挙げ、本発明を更に詳細に説明するが、これらは本発明を何ら制限するものではない。

【００４７】（実施例１）７．５%加塩卵黄を水酸化ナトリウムでｐＨ８．２に調整した加塩卵黄１００ｋｇに対して豚の膵液由来のホスフォリパーゼＡ ２０．０１５ｋｇ（５５５０００ホスフォリパーゼユニット）を加え、４０℃にて７時間処理し、次いでブロメライン０．００３ｋｇ（９００００プロテアーゼユニット）を加え、４０℃にて４時間処理し、５℃まで冷却して、酵素処理卵黄（Ｉ）を得た。次に、水７．５重量部、水飴（水分２５重量%）４重量部、醸造酢４重量部、岩塩２重量部、グルタミン酸ナトリウム０．２重量部、芥子粉０．３重量部及び上記酵素処理卵黄（Ｉ）７重量部を混合して水相を調製した。別に、植物ステロール２重量部を、加熱した大豆サラダ油７３重量部に溶解して油相を調製した。次いで、上記水相を撹拌しつつ上記油相を加え、水中油型予備乳化物を得、これをコロイドミルにて乳化して、本発明の水中油型乳化物を得た。この水中油型乳化物を５℃の冷蔵庫にて２４時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【００４８】（実施例２）大豆起源の植物ステロール１０重量部を、加熱した菜種油９０重量部に溶解後、位置選択性の無いリパーゼである、Alcaligenes 属由来のリパーゼ１重量部を加え、６５℃で、反応系の水分を２００ｐｐｍに調整し、エステル交換反応を行った。次いで、リパーゼを濾過して除去し、白土２重量部を添加して漂白し、温度２００℃で脱臭し、植物ステロール脂肪酸エステル含有油脂（Ｉ）を得た。この油脂（Ｉ）の組成は、植物ステロール脂肪酸エステル１５重量%、モノグリセリド１重量%、ジグリセリド１２重量%、トリグリセリド７１重量%、未反応の植物ステロール１重量%であった。この油脂（Ｉ）の植物ステロール脂肪酸エステル、トリグリセリド及びジグリセリドの脂肪酸組成を下記表１に示した。次に、実施例１の油相の代わりに上記植物ステロール脂肪酸エステル含有油脂（Ｉ）を用いた以外は、実施例１と同様にして、本発明の水中油型乳化物を得た。この水中油型乳化物を５℃の冷蔵庫にて２４時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【００４９】（実施例３）８%加塩卵黄９０ｋｇに水７ｋｇ及び醸造酢３ｋｇを加えてｐＨ４．６に調整した加塩卵黄１００ｋｇに対してAspergillus oryzae属由来のホスフォリパーゼA$_1$ ０．０２ｋｇ（８００００ホスフォリパーゼユニット）を加え、４５℃にて７時間処理し、次いでブロメライン０．００５ｋｇ（１５００００プロテアーゼユニット）を加え、４５℃にて３時間処理し、５℃まで冷却して、酵素処理卵黄（II）を得た。次に、実施例１の酵素処理卵黄（Ｉ）の代わりに、上記酵素処理卵黄（II）を用いた以外は、実施例１と同様にして、本発明の水中油型乳化物を得た。この水中油型乳化物を５℃の冷蔵庫にて２４時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【００５０】（実施例４）大豆起源の植物ステロール１０重量部を、加熱したパームオレイン９０重量部に溶解後、実施例２と同様の処理を行い、植物ステロール脂肪酸エステル含有油脂（II）を得た。この油脂（II）の組成は、植物ステロール脂肪酸エステル１４重量%、モノグリセリド１重量%、ジグリセリド１２重量%、トリグリセリド７２重量%、未反応の植物ステロール１重量%であった。この油脂（II）の植物ステロール脂肪酸エステル、トリグリセリド及びジグリセリドの脂肪酸組成を下記表１に示した。次に、実施例１の油相の代わりに上記植物ステロール脂肪酸エステル含有油脂（II）を用いた以外は、実施例１と同様にして、本発明の水中油型乳化物を得た。この水中油型乳化物を５℃の冷蔵庫にて２

4時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【0051】（実施例5）水39．58重量部、ぶどう糖果糖液糖（水分25重量%）8重量部、グラニュー糖2重量部、50%発酵乳酸0．5重量部、レモン果汁1重量部、醸造酢4重量部、精製塩1．5重量部、コハク酸2ナトリウム結晶0．01重量部、カレー粉2重量部、芥子粉0．2重量部、粉末胡椒0．01重量部及び上記酵素処理卵黄（I）8重量部を混合して水相を調製した。別に、上記植物ステロール脂肪酸エステル含有油脂（I）30重量部に、馬鈴薯澱粉をリン酸架橋後に糊化した化工澱粉3重量部、キサンタンガム0．1重量部及びカレーフレーバー0．1重量部を分散・溶解して油相を調製した。次いで、上記水相を撹拌しつつ上記油相を加え、水中油型予備乳化物を得、これをホモゲナイザーにて20MPaの均質化圧力にて均質化して、本発明の水中油型乳化物を得た。この水中油型乳化物を5℃の冷蔵庫にて24時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【0052】（比較例1）酵素処理卵黄（I）の代わりに7．5%加塩卵黄を用いた以外は、実施例1と同様にして、水中油型乳化物を得た。この水中油型乳化物を5℃の冷蔵庫にて24時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化は破壊され、油が分離した。また、この水中油型乳化物は、風味及び食感が劣るものであった。

【0053】（比較例2）酵素処理卵黄（I）の代わりに7．5%加塩卵黄を用いた以外は、実施例5と同様にして、水中油型乳化物を得た。この水中油型乳化物を5℃の冷蔵庫にて24時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化は破壊され、油が分離した。また、この水中油型乳化物は、風味及び食感が劣るものであった。

【0054】（実施例6）大豆起源の植物ステロール43重量部を、加熱した菜種油19重量部及びオレイン酸エチルエステル38重量部の混合物に溶解後、実施例2と同様の処理を行ない、植物ステロール脂肪酸エステル含有油脂(III)を得た。この油脂(III)の組成は、植物ステロール脂肪酸エステル76重量%、モノグリセリド0重量%、ジグリセリド4重量%、トリグリセリド17重量%、未反応の植物ステロール3重量%であった。この油脂(III)の植物ステロール脂肪酸エステル、トリグリセリド及びジグリセリドの脂肪酸組成を下記表1に示した。次に、植物ステロール脂肪酸エステル含有油脂（I）の代わりに上記植物ステロール脂肪酸エステル含有油脂(III)を用いた以外は、実施例5と同様にして、本発明の水中油型乳化物を得た。この水中油型乳化物を5℃の冷蔵庫にて24時間冷蔵後、スパチェラにて撹拌したところ、水中油型乳化の破壊は見られず、乳化は安定であった。また、この水中油型乳化物は、風味及び食感の良いものであった。

【0055】

【表1】

（単位：重量%）

	植物ステロール脂肪酸エステル含有油脂		
	(I)	(II)	(III)
トリグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	59	60	90
C18:2	22	21	6
others	13	13	3
植物ステロール脂肪酸エステルの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	57	59	91
C18:2	22	22	5
others	15	13	3
ジグリセリドの脂肪酸組成			
C16:0	4	4	1
C18:0	2	2	0
C18:1	58	60	91
C18:2	22	22	4
others	14	12	4

【００５６】
【発明の効果】本発明の水中油型乳化物は、血漿コレステロール濃度低下機能を有する植物ステロール及び／又は植物ステロール脂肪酸エステルを含有する水中油型乳化物であって、長期間水中油型乳化が安定で且つ風味と食感の良いものである。

【手続補正書】
【提出日】平成１３年5月１０日（２００１．５．１０）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】０００７
【補正方法】変更
【補正内容】

【０００７】更に、特開２０００－１０２３６１号公報には、ステロールエステルと、乳化剤又はハイドロコロイドと、脂肪結晶抑制剤とを有するサラダドレッシング及びその製造方法が提案されているが、乳化安定化のために多量の乳化剤やハイドロコロイドが配合されるため、風味と食感が悪いという問題がある。

フロントページの続き

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